

## Effect of larval weight on quantity and quality of mealworm protein isolates

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Larvae of the flour beetle (*Tenebrio molitor*) go through a larval stage in which they achieve substantial growth and typically reach a weight of 80-140 mg before pupation, depending on the substrate and other rearing conditions. Commercially traded mealworms are not necessarily standardized such that weight variations between batches may occur.

The aim of this study was to determine how such variations in the larval weight affect the protein yield and techno-functional properties of protein isolates. To determine whether possible differences between small and large larvae could be additionally influenced by the extraction procedure, proteins from oven dried small (70 mg) and large (105 mg) mealworms were isolated by alkaline extraction and acidic extraction plus salting out. The protein isolates obtained were quantified and analyzed in terms of their composition and for selected functional properties.

Extraction efficiencies related to the protein content of the starting material ranged between 7,9 % and 32,3 % and decreased in the order large/alkaline > small/alkaline >> small/acidic > large/acidic. Techno-functional properties varied only marginally between small and large larvae. By contrast, significant differences were found between the two extraction methods. The alkaline extracts contained larger proteins and showed potential as emulsifiers, whereas the acidic extracts contained a large fraction of smaller proteins and exhibited both emulsifying and gel-forming properties. Furthermore, the isoelectric point of the alkaline extracts was at substantially lower pH than that of the acidic extracts.

With regard to protein yield, larger larvae are preferable. Irrespective of the extraction method, certain techno-functional properties vary to a small extent depending on the larval weight.